Center Innovation Fund: AFRC CIF

Active Control of Tailored Laminates

Completed Technology Project (2013 - 2015)

Project Introduction

Part of a proposed suite of technologies to enable a fully morphing seamless wing, this effort focuses on tailoring composite materials to enhance structural response and generate out-of-plane deflections using in-plane forces. Composite structures employ embedded fibers in different directions to increase strength. This research seeks to investigate the use of tailored composites in these types of applications.

Work to date: An analytical feasibility study completed in 2013 determined that in-plane loading can generate significant out-of-plane displacement, effectively yielding wing twist. Also determined was the degree of structural interaction of stiffeners and how to mitigate the suppression of structural response.

Looking ahead: Future work will concentrate on enabling continuous outer mold line structures that can change shape. This revolutionary new approach for aircraft design will improve performance and fuel efficiency in numerous ways, as seamless wings would reduce drag and streamline and simplify an airplane's maneuverability.

Benefits

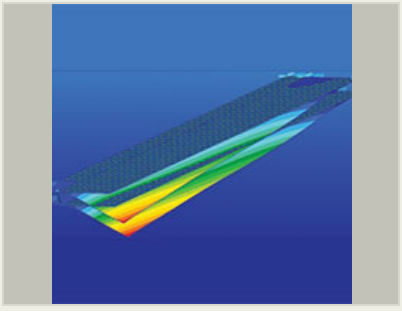
- **Economical:** Increases fuel efficiency by reducing drag
- **Robust:** Features a simpler wing design without control surfaces that is easy to maintain and less likely to need repair

Applications

- Commercial aircraft
- General aviation aircraft
- Military transport aircraft

Anticipated Benefits

- **Economical:** Increases fuel efficiency by reducing drag
- **Robust:** Features a simpler wing design without control surfaces that is easy to maintain and less likely to need repair



Composite modeling

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Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Center / Facility:

Armstrong Flight Research Center (AFRC)

Responsible Program:

Center Innovation Fund: AFRC CIF

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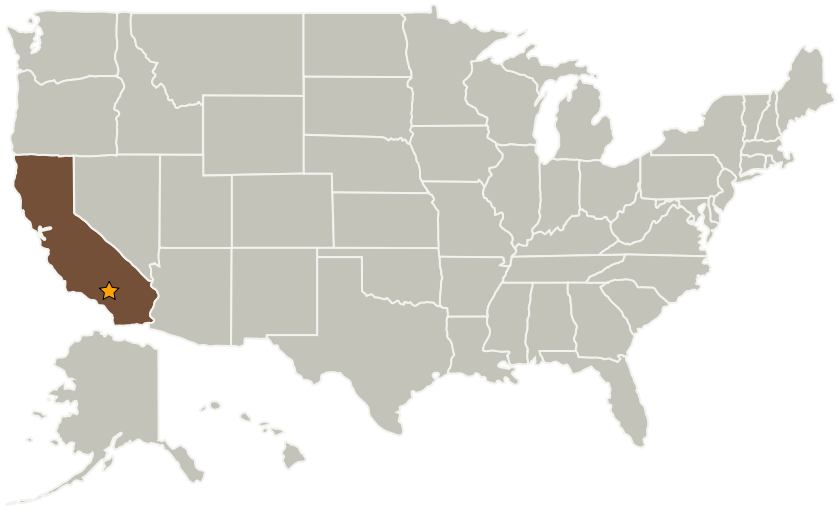
Primary U.S. Work Locations and Key Partners



Organizations Performing Work	Role	Type	Location
★Armstrong Flight Research Center(AFRC)	Lead Organization	NASA Center	Edwards, California

Primary U.S. Work Locations
California

Project Management

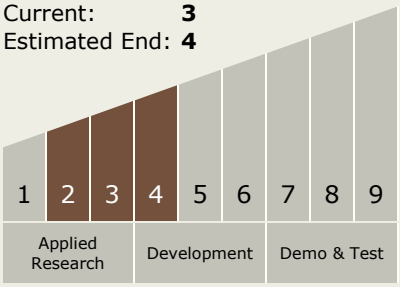
Program Director:
Michael R Lapointe

Program Manager:
David F Voracek

Principal Investigator:
Chris Kostyk

Technology Maturity (TRL)

Start: **2**
Current: **3**
Estimated End: **4**

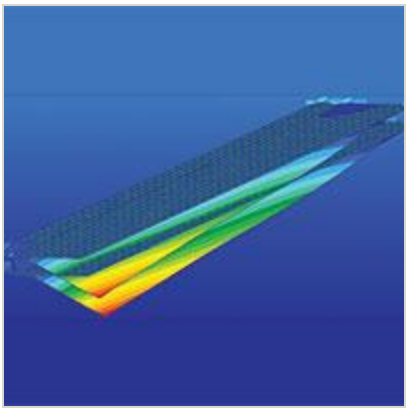


Technology Areas

Primary:

- TX15 Flight Vehicle Systems
  - TX15.1 Aerosciences
    - TX15.1.6 Advanced Atmospheric Flight Vehicles

Images



Composite modeling
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(https://techport.nasa.gov/image/16325)